

(2) Remarks

Dear Examiner,

Responsive to the outstanding Office Action dated 06/15/2005, we have looked at the cited prior art brought up on form PTO-892, and have proposed the following course of actions.

1. Other than US-6,819,853 to Lam, all other prior art patents and applications describe vertically stacked waveguides and methods of waveguide fabrications. In the Background sections of our specification, we also cite the existence of vertically coupled and vertically stacked waveguides. Further, in our Figure 2 of the specification, we show the conventional method of transferring optical power from one layer to another by use of a vertically coupled directional coupler. US-6,724,968 to Lackrit, specifically Figure 6 therein for example, also shows the conventional directional coupler. The couplers and optical vias cited in the prior art, except for Lam, do not provide broadband, wavelength independent, and fabrication insensitive power transfer between the waveguides. These prior art citations are used in conjunction with Lam to form a basis of some rejections of claims. Therefore, we focus our attention on overcoming Lam.

2. US-6,819,853 to Lam does describe one embodiment of a broadband optical via. The basis for rejection of claims 1,3-7, and 9-12 in our application is the cited paragraph of 35 U.S.C. 102, in which a person shall not be entitled to a US patent if the applicant's invention occurred after the filing date of the prior art. In the following section we file for a Declaration of Prior Invention pursuant to section 1.131, in which our documented invention predates the filing of US-6,819,853. Further we establish a timeline of diligence between our initial invention date, and the filing of our first provisional patent on the subject matter.

This declaration forms the basis for responding to the office action. In light of our prior invention, and the basis for rejection of claims 1, 3-7, 9-12, as well as 2 and 8 when used in conjunction with Lam, we seek allowance of our claims unamended.

(3) Declaration filed under section 1.131

We request that the examiner take into account our affidavit of prior invention pursuant to section 1.131, in overcoming US-6,819,853 to Lam, which forms the basis of prior art based rejection of our claims.

Inventor's credentials

Dr. Little obtained a B.A.Sc. in Electrical Engineering in 1984, and a PhD in Electrical Engineering in 1994, both from the University of Waterloo, Canada. He held a Post Doctoral position, and subsequently a Research Associate position, at the Massachusetts Institute of Technology (MIT) for five years. He has held a Research Professor position and the University of Maryland, as well as positions at Nortel Networks and Fujitsu. He has consulted for a number fiber optic companies. In 2000, he founded Little Optics Inc, and served as its President and Chief Technology Officer. The company has since raised \$25M in venture capital. Little Optics Inc pioneered high index contrast photonic circuits. Dr. Little has published over 75 articles in peer reviewed journals, given 15 invited talks, and holds several patents in the field.

Place of Invention

The work performed in conceiving, analyzing, and reducing to practice of this invention was performed in the USA.

The following attached pages (page 6) from my lab notebook detail this invention as occurring before the priority dates of the cited prior art reference (US 6,819,853 to Lam et. al.)

I declare that the devices and products of this application were conceived by me on the dates listed in the lab notes.


Brent Little

Page 6 is a copy of page 36 of Brent Little's "Little Optics Lab Notebook #4" showing an embodiment of the broadband optical via of the present application. The schematic shown in the lab book is similar to Figure 3A in the present application. The optical response characteristics shown in the lab book are those reproduced in Figures 5a, 5b, and 5c in the present application. This concept is recorded, dated and witnessed on June 17, 2002.

Between the initially recorded conception date of June 17, 2002, and our priority provisional application date of February 11, 2003 for this application, there was a continuity of diligent activity in reducing the broadband optical via to practice. The following recorded activities took place between those two dates:

- (1) October 15, 2002: Weekly R&D meeting with distributed R&D minutes discussing broadband optical via.
- (2) October 22, 2002: Weekly R&D meeting with distributed R&D minutes discussing broadband optical via.
- (3) October 29, 2002: Weekly R&D meeting with distributed R&D minutes discussing broadband optical via.
- (4) November 11, 2002: Design memo released detailing design of broadband optical via in preparation of photomask design and layout, followed by fabrication of test devices.
- (5) January 7, 2003: Photomask layout having broadband optical vias completed and a documented design review meeting was held.
- (6) January 12, 2003: Photomask data file including broadband optical vias released to DuPont Photomask Inc, under purchase orders #01-585, #01-591, #01-593, and #01-602.

June 17/02

Broadband Optical Via

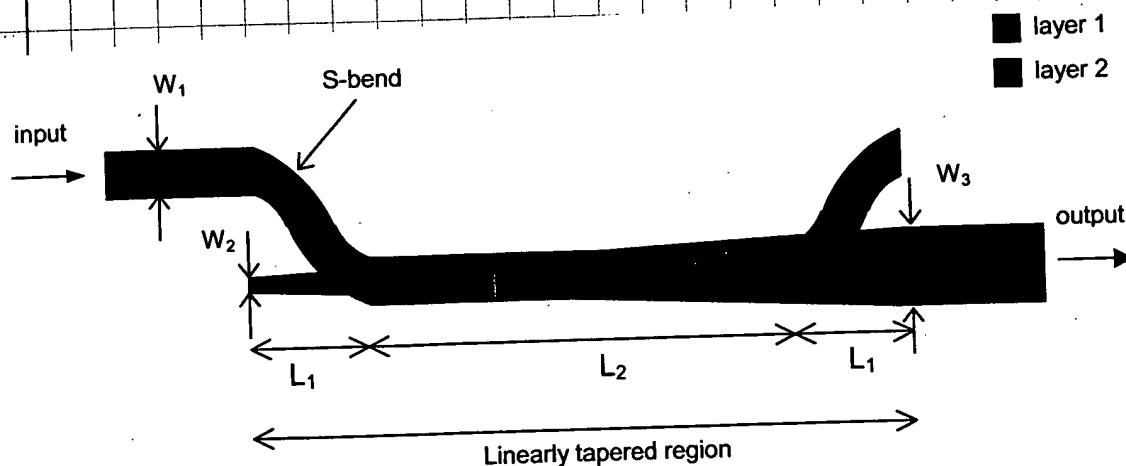
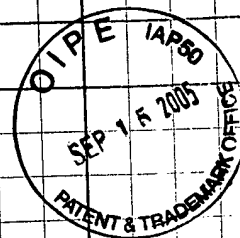


FIGURE 2. A broadband, fabrication insensitive optical via. Coupling from one layer to the other is governed by semi-adiabatic coupling.

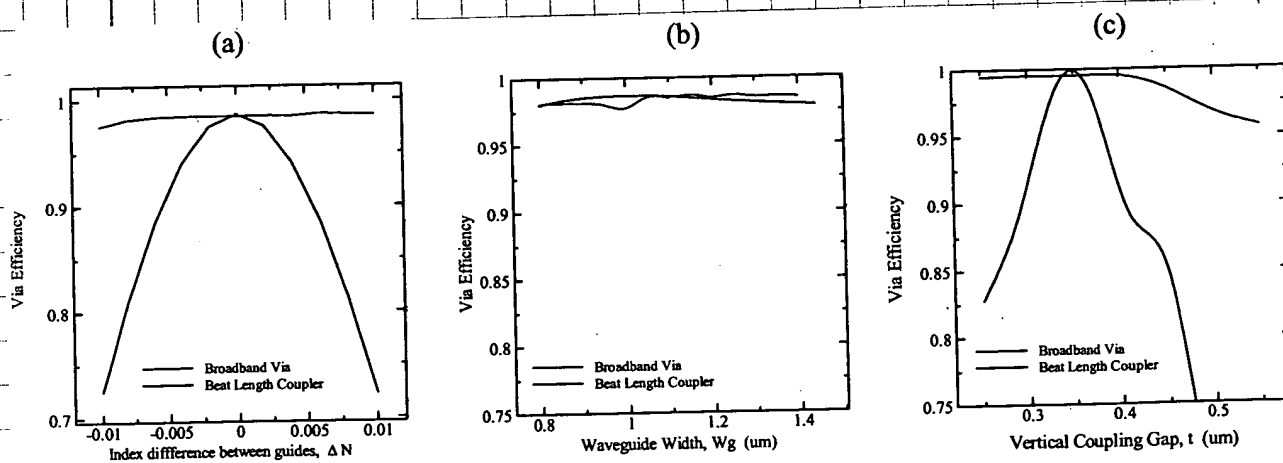


FIGURE 3. Via efficiency as a function of (a) index contrast between the two waveguides, (b) nominal waveguide widths, and (c) vertical separation (coupling gap) between the two layers.

The beat length coupler comparison has a length of $L_c = 54 \mu\text{m}$
other values

$$n_{e0} = 1.70$$

$$n_{o1} = 1.45$$

$$W_1 = 1.1 \mu\text{m}$$

$$W_2 = 0.5 \mu\text{m}$$

$$W_3 = 1.7 \mu\text{m}$$

$$\text{thickness } h_r = h_b = 1.5 \mu\text{m}$$

$$L_1 = 150 \mu\text{m}$$

$$L_2 = 350 \mu\text{m}$$

$$\text{guide separation after s-bend} = 3 \mu\text{m e-c}$$

Conditional Request for Constructive Assistance

Applicant has amended the specification of this application so that they are proper, definite and define novel structure which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. section 2173.02 and section 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very Respectively,

A handwritten signature in black ink, appearing to read "Brent Little", with a stylized flourish at the end.

Brent E. Little

Applicant Pro Se